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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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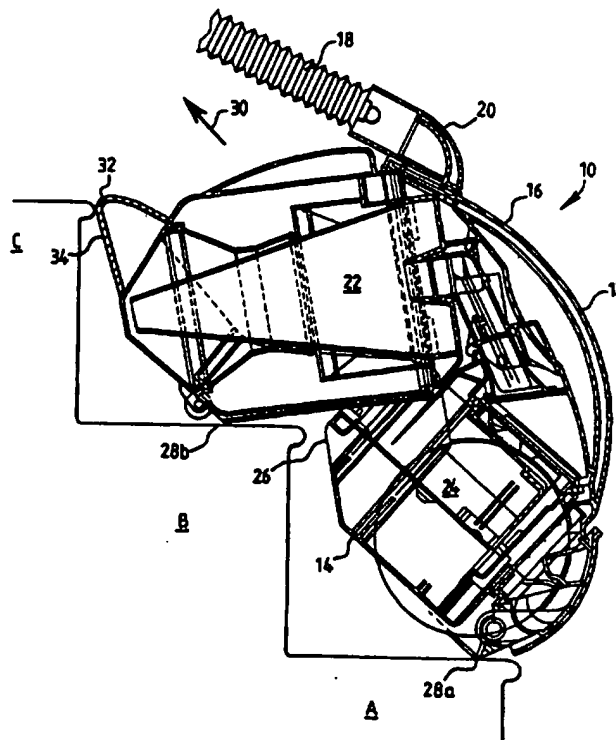
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## (57) Abstract

The invention provides a vacuum cleaner (10) comprising a housing (12) containing apparatus (22) for separating dirt and dust from an airflow, the vacuum cleaner (10) being configured so as to allow it to be positioned on a flight of stairs, wherein the housing (12) has a forward end (32) shaped so as to facilitate the sliding of the vacuum cleaner (10) over the flight of stairs in an upward direction.



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## VACUUM CLEANER

The invention relates to a vacuum cleaner, particularly to a cylinder-type vacuum cleaner.

Very few vacuum cleaners, upright or cylinder, are designed to be stably positioned on a flight of stairs. UK patent No. 658328 discloses a cylinder-type machine having skids attached to the underside of the cylindrical housing, the skids having notches located therein so tht the machine can be "hooked" onto a stair nosing. This allows the user use of both hands to operate the hose or wand of the cleaner. A similar but improved design is described in our pending UK patent application No. 9417749.0 and corresponding PCT application No. PCT/GB94/02575.

Neither of the prior art machines is designed or intended to be moved up or down a flight of stairs other than by the user lifting the entire machine and repositioning it on another convenient part of the flight of stairs. This can be quite cumbersome, especially if the user must also keep hold of the hose or wand during repositioning of the machine. It would be more convenient if the machine could be dragged or slid up the flight without having to physically lift the

body of the machine but the configuration of each prior art machine is such that dragging or sliding is difficult and awkward and results in a substantial jolting of the machine. This can be detrimental to the operation of the machine.

An object of the invention is to provide a vacuum cleaner which can be easily manoeuvred on a flight of stairs.

The invention provides a vacuum cleaner as set out in claim 1. Advantageous features of the invention are set out in the subsidiary claims.

The shaping of the forward end of the housing so as to facilitate sliding of the machine up a flight of stairs means that upward sliding of the machine is smoother and less jolting so that the likelihood of damaging the machine by such action is minimised.

Embodiments of the invention will now be described with reference to the accompanying drawings, wherein:

Figure 1 is a side sectional view of a vacuum cleaner according to the invention positioned on a flight of stairs;

Figures 2a - 2d illustrate progressive positions of the vacuum cleaner when caused to slide upon a flight of stairs in the upward direction; and

Figures 3a and 3b illustrate a second embodiment of the present invention positioned on a flight of stairs.

A vacuum cleaner according to the present invention

is illustrated in Figure 1. The vacuum cleaner 10 consists essentially of a housing 12 having a base 14 and a cover 16. A hose 18 is connected to the cover 16 of the housing 12 by means of a swivel coupling 20. Positioned inside the housing 12 are dust separating apparatus 22, a motor 24 and connection means for causing the vacuum cleaner to operate so as to draw dirty air into the housing 12 along the hose 18, to separate dirt and dust particles from the air flow, and to expel clean air to the atmosphere. The interior workings of the machine 10 do not form an essential part of the present invention and will not be described any further here.

The base 14 of the cover 12 incorporates a recess 26 which can accommodate the nosing of a stair tread. By means of this shaping, which forms the subject of our pending UK patent application No. 9417749.0 and PCT application No. PCT/GB94/02575, the machine 10 can be positioned on a flight of stairs in a stable manner. The base 14 of the cover 12 rests on adjacent stair treads A, B and at contact portions 28a, 28b.

When the machine 10 is in use, there is a desire on the part of the user to drag the machine 10 up the flight of stairs merely by pulling on the hose 18. In order to facilitate the sliding of the machine 10 up the stairs in the direction of the arrow 30, a nose or shaping 32 is provided on the forward end of the housing

12. The nose 32 projects forwardly of the casing 12 and is inclined upwardly with respect to the general plane of the base 14 of the cover 12 such that, when the user applies a pulling force to the hose 18 in the direction of arrow 30, the nose 32 presents a smooth surface to the nosing of the stair C immediately above the uppermost stair A,B on which the machine is currently resting. Sufficient pulling force in the direction of arrow 30 will cause the machine 10 to be pulled upwardly over the flight of stairs and the nosing 32 facilitates the smooth upward passage of the machine 10 by virtue of its shaping. The lower surface 34 of the nose 32 provides a surface by means of which the forward portion of the machine 10 is guided smoothly over the nosing of stair C.

Figures 2a-2d illustrate the upward motion of the machine 10 when an upward force is applied to the hose 18 in the direction of the arrow 30. The position illustrated in Figure 1 is again illustrated in Figure 2a and will now be regarded as a starting position. Contact portions 28a and 28b are in contact with the treads of stairs A and B. The foremost extremity of nose 32 is in contact with or adjacent the nosing of stair C.

Application of a pulling force in the direction of the arrow 30 causes the machine 10 to ride upwardly over the stairs. Contact portions 28a and 28b move out of

contact with the treads of stairs A and B and the machine is then supported on the nosings of stairs B and C by contact with the surface of the recess 26 (or another portion of the base 14 of the housing 12) and with the lower surface 34 of the nose 32 respectively. Continued pulling in the direction of the arrow 30 causes the machine 10 to ride further up on the nosings of stairs B and C until the machine is supported by contact with the base 14 of the housing 12 on either side of the recess 26. Eventually, the nosing of stair C will come into contact with at least one wall of the recess 26 whereupon the contact portions 28a, 28b will be brought into contact with the treads of stairs B and C. Further movement in the direction of arrow 30 will ensure that the contact portions 28a, 28b are positioned sufficiently far from the nosings of stairs B and C for the machine 10 to be stably supported. The new stable position is identical to that shown in Figure 2a but with the machine 10 resting on stairs B and C instead of stairs A and B.

It will be appreciated that the configuration shown in Figures 1 and 2 is not exhaustive. An alternative embodiment of the invention is illustrated in Figures 3a and 3b. In these drawings, the housing 12' of the machine 10' is closed on its underside by means of a ski or sled 15'. The ski or sled 15' has a forwardly extending and upturned nose portion 32' which is adapted



to come into contact with the nosing of a stair upwardly adjacent to the stairs on which the machine 10' is currently resting. At the rear end of the ski or sled 15' is a projection 17' which is pivotally connected to the sled 15'. Arranged between the projection 17' and the skid or sled 15' is a spring 19' which biases the free end of the projection 17' away from the ski or sled 15'.

The purpose of this projection 17' is to provide a brake or stop which prevents the machine 10' from sliding downwardly over the stairs. The rest position is shown in Figure 3b with the projection 17' biased into an operative position in which it can be used as a stop. In use, the projection 17' engages with the tread of a stair so as to prevent the machine 10' from sliding downwardly. The projection 17' can incorporate means for gripping the stair tread, for example in the form of spikes, claws or rubber feet, if desired. The remainder of the underside of the skid or sled 15' is smooth and substantially planar, apart from the upward inclination of the nose portion 32'.

If it is desired to drag or slide the machine 10' upwardly over the stairs, an upwards force is applied in the direction of arrow 30', possibly by pulling the hose 18'. The machine then moves upwardly in the direction of arrow 30' with the nose portion 32' coming into contact with the nosing of the stair immediately above

the uppermost of the stairs on which the machine 10' is currently resting. The nose portion 32' guides the nosing of this stair underneath the housing 12' of the machine 10' and the upward movement is smooth and easy to handle. The projection 17' is deflected against the bias of the spring 19' as it passes over the nosing of a stair tread, but the action of the spring 19' also causes the projection 17' to move back into its operative position as soon as it has passed the appropriate nosing. If the user then decides to maintain the machine 10' in the new position, contact between the free end of the projection 17' and the nearest stair tread in the downward direction will prevent any further downward sliding of the machine.

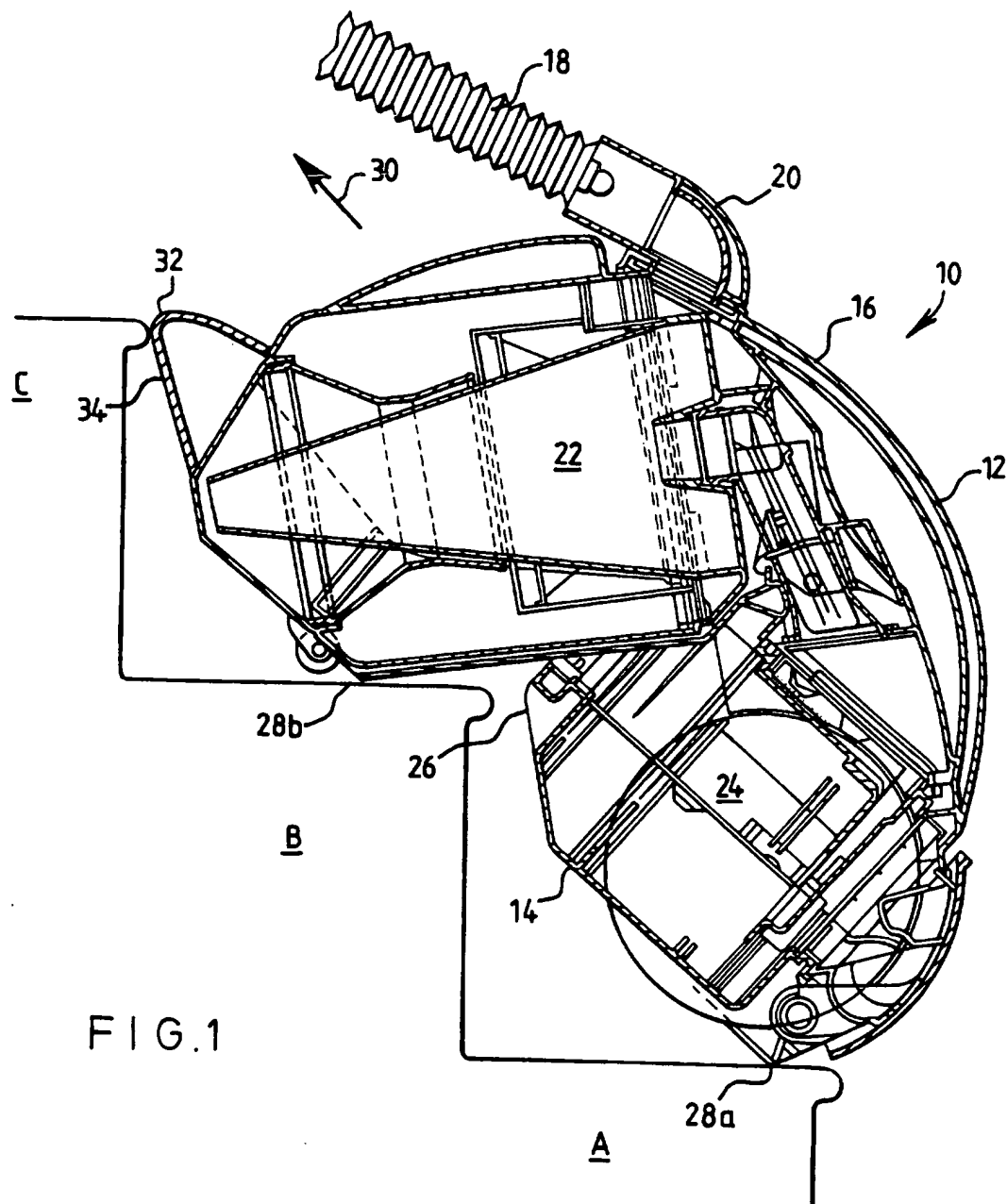
It will be appreciated that the projection 17' can be positioned at virtually any point along the substantially planar portion of the ski or sled 15'. In particular, the projection 17' can be positioned at or adjacent the forward end of the machine 10' or midway between the forward and rear extremities of the machine 10'.

The embodiments illustrated in the accompanying drawings show that the housing 12, 12' incorporates cyclonic means for separating dirt and dust from the air flow drawn in through the hose 18, 18'. This is a preferably feature but should not be regarded as limiting to the present invention.

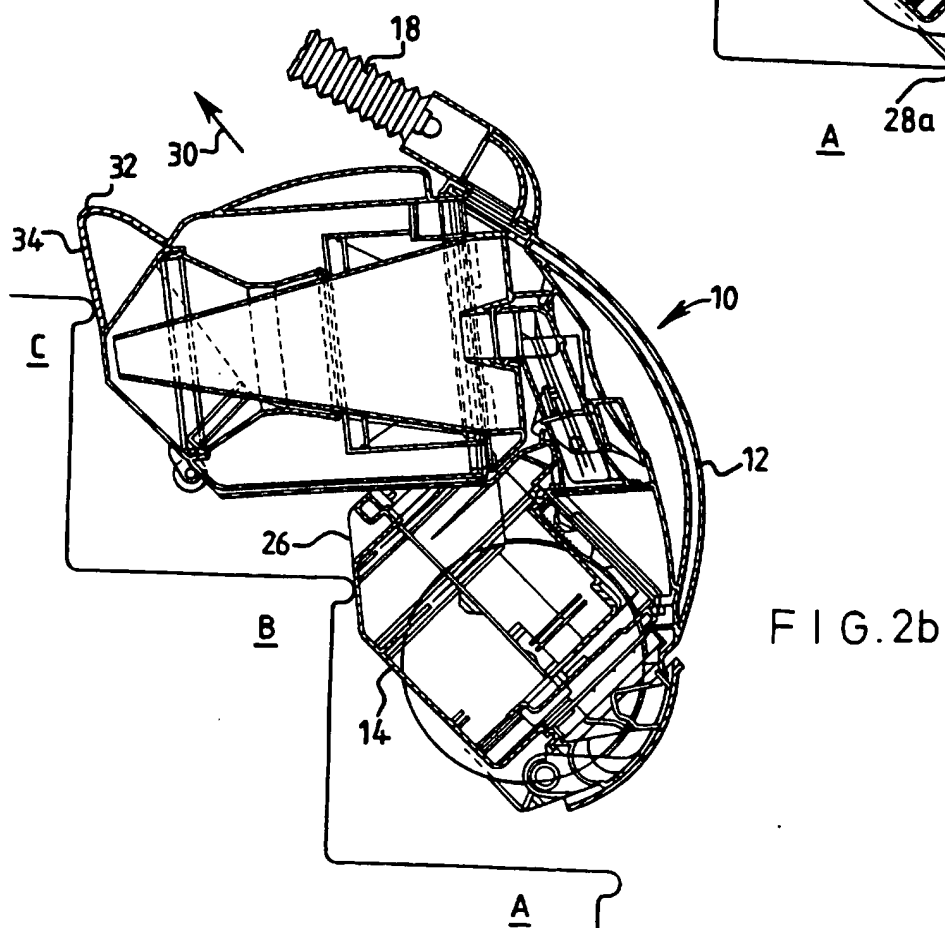
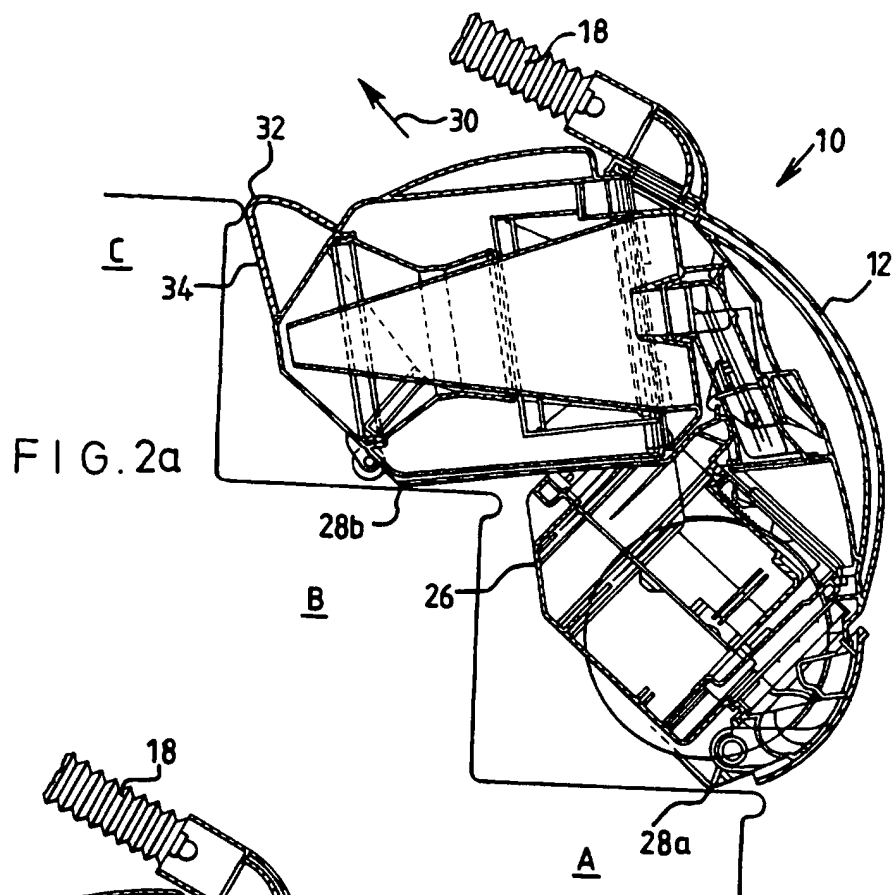
## CLAIMS

1. A vacuum cleaner comprising a housing containing apparatus for separating dirt and dust from an airflow, the vacuum cleaner being configured so as to allow it to be positioned on a flight of stairs, wherein the housing has a forward end shaped so as to facilitate the sliding of the vacuum cleaner over the flight of stairs in an upward direction.
2. A vacuum cleaner as claimed in claim 1, wherein the forward end of the housing has an upwardly inclined nose adapted to present a smooth surface to a stair nosing when, in use, the vacuum cleaner is caused to slide over the flight of stairs in an upward direction.
3. A vacuum cleaner as claimed in claim 1 or 2, wherein the base of the housing is configured so as to allow the vacuum cleaner to be positioned on a flight of stairs.
4. A vacuum cleaner as claimed in claim 3, wherein the base of the housing incorporates an upwardly extending recess for accommodating a stair nosing, and contact portions, arranged on either side of the recess, for contacting two adjacent stair treads and supporting the vacuum cleaner thereon.

5. A vacuum cleaner as claimed in any one of the preceding claims, wherein a projection is provided for engaging with a stair tread and for preventing sliding of the vacuum cleaner over the flight of stairs in a downward direction.
6. A vacuum cleaner as claimed in claim 5, wherein the projection is provided on the base of the housing.
7. A vacuum cleaner as claimed in claim 5 or 6, wherein the projection is movable between an operative position in which the projection extends away from the vacuum cleaner at an angle to the general plane of the base of the housing, and an inoperative position in which the projection lies substantially parallel to the general plane of the base of the housing.
8. A vacuum cleaner as claimed in claim 7, wherein the projection is biased into the operative position.
9. A vacuum cleaner as claimed in any one of claims 5 to 8, wherein the projection is located at or adjacent a rearward end of the vacuum cleaner.
10. A vacuum cleaner as claimed in any one of claims 5 to 8, wherein the projection is located substantially centrally of the vacuum cleaner.



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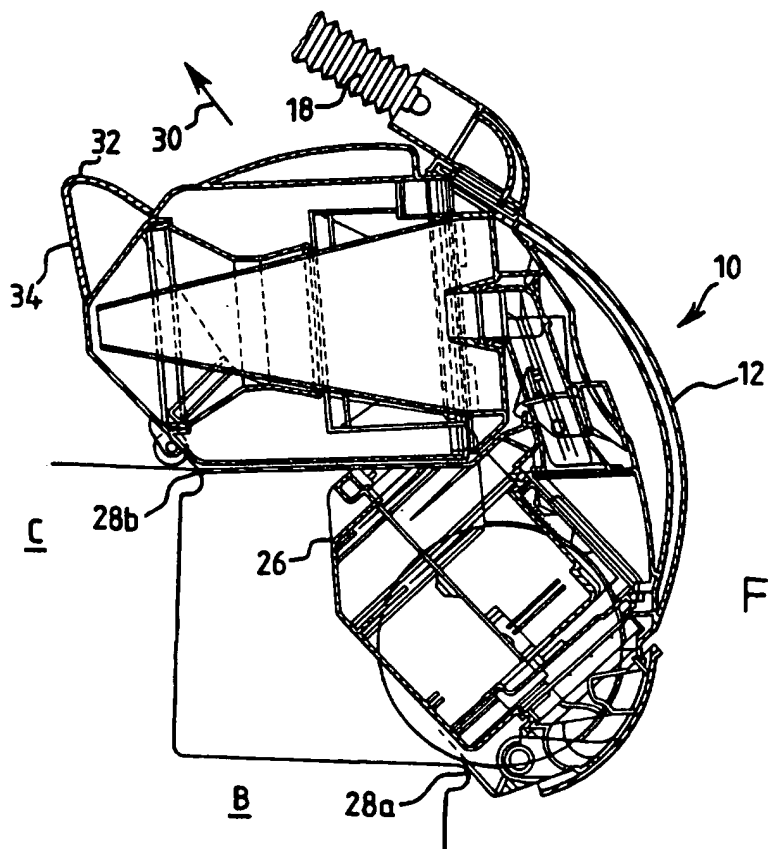
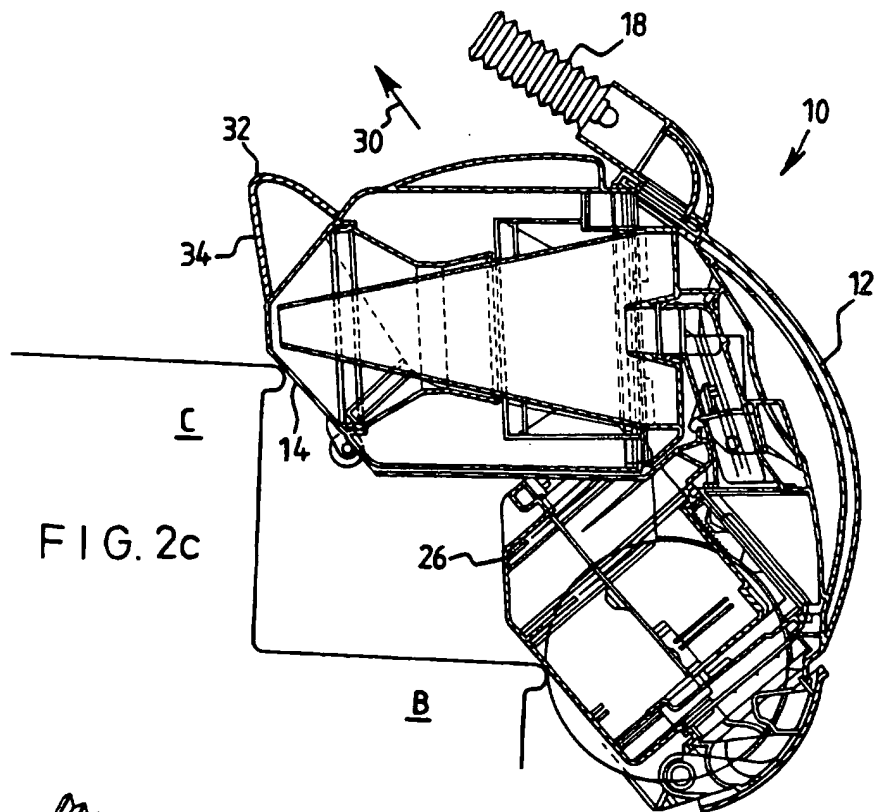


FIG. 3a

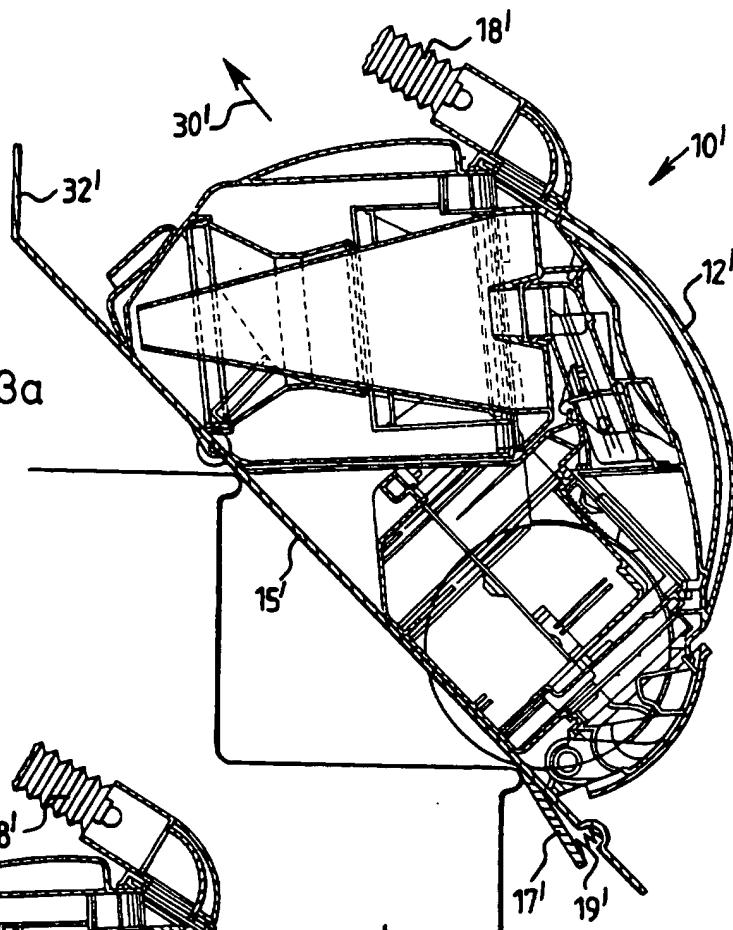
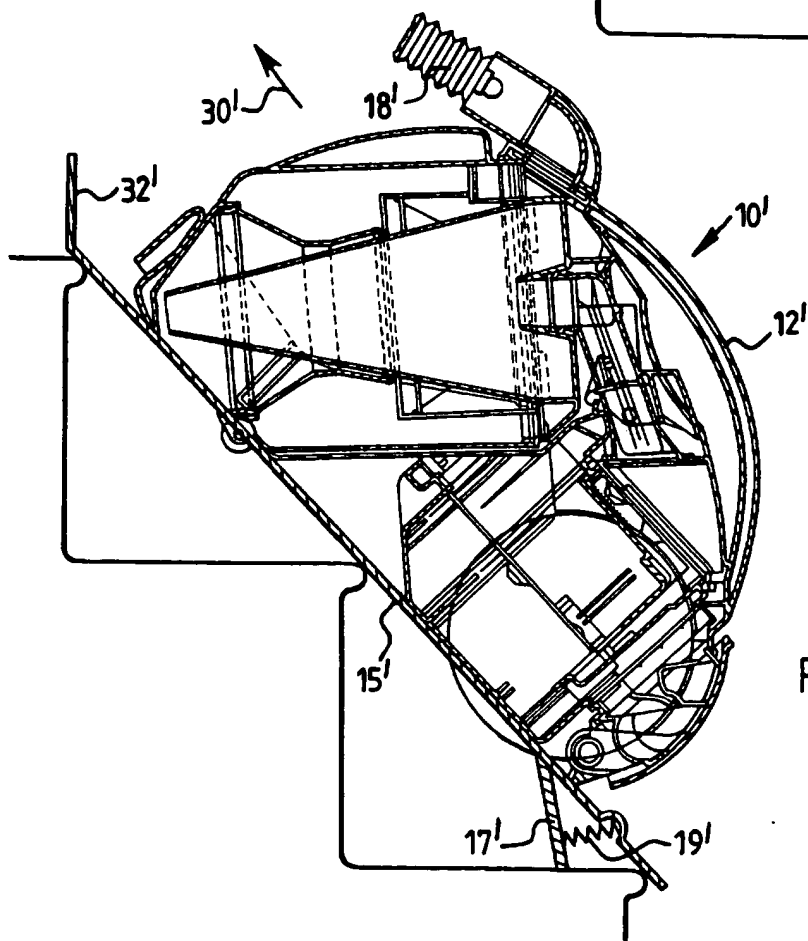


FIG. 3b





# INTERNATIONAL SEARCH REPORT

Inter- national Application No  
PCT/GB 96/00145

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 A47L5/36 A47L5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,3 015 123 (R. DESCARRIES) 2 January 1962 see column 2, line 18 - column 4, line 39; figures	1-3,5-10
X	GB,A,658 328 (G.W. PATCHETT & AL) 3 October 1951 cited in the application see the whole document	1-4
X	NL,C,50 067 (J.A.C. MALCHUS) 15 March 1941 see the whole document	1-3
A	NL,C,65 453 (J.A.C. MALCHUS) 15 March 1950 see the whole document -/--	1-3,5-10

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28 March 1996

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A	DE,U,93 02 645 (J. BALLERING) 22 April 1993 see page 3 - page 4; figures -----	1-4

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3015123	02-01-62	NONE	
GB-A-658328		NONE	
NL-C-50067		NONE	
NL-C-65453		NONE	
DE-U-9302645	22-04-93	NONE	